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ABSTRACT

Performance-oriented instruction was developed, field tested, and refined in two Advanced Individual Training (AIT) programs--Armor Reconnaissance Specialist (MOS 11D) and Armor Crewman (MOS 11E). Tasks for both MOS (Military Occupational Specialty) were inventoried and the inventories were reduced by eliminating those tasks which are not required for entry-level duty performance. Performance objectives were written for tasks that could be feasibly and appropriately trained. These performance objectives were translated into performance measures and tests. Both programs were revised to include the performance objectives and measures. Field test, data collection, and refinement of the two training programs extended over 10 successive training cycles. The approximate number of trainees involved were 1,000 and 2,000 respectively. Programs were refined on the basis of observation of instruction, results of formal performance examinations, and attitude indicators. The final programs resulted in high trainee proficiency levels, and favorable trainee and instructor attitudes. Questionnaires used to sample trainee and instructor attitudes toward the performance-oriented programs are appended. (Author/BP)

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Final Report

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Development, Field Test, and Refinement of Performance Training Programs in Armor Advanced Individual Training

Douglas L. Young and John E. Tayler

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Performance-oriented instruction was developed, field tested, and refined in two Advanced Individual Training (AIT) programs--Armor Reconnaissance Specialist (MOS 11D) and Armor Crewman (MOS 11E). Tasks for both MOS were inventoried and the inventories were reduced by eliminating those tasks which are not required for entry-level duty performance. Performance objectives were written for tasks that could be feasibly and appropriately trained. These performance objectives were translated into performance measures and tests. Both programs were revised

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to include the performance objectives and measures.

Field test, data collection and refinement of the two training programs extended over 10 successive training cycles for 11D (N≈1,000) and 14 successive training cycles for 11E (N≈2,000). Programs were refined on the basis of observation of instruction, results of formal performance examinations, and attitude indicators. The final programs resulted in high trainee proficiency levels, and favorable trainee and instructor attitudes.

SUMMARY AND CONCLUSIONS

PURPOSE

This study was part of Work Unit ATC-PERFORM, a project which assisted the Army in the review, evaluation, and refinement of performance-based training in Army training centers. At the USA Armor Center, the work was designed to develop, field test, and refine performance-oriented training techniques in the Reconaissance Specialist (MOS 11D) and Armor Crewman (MOS 11E) Advanced Individual Training Programs.

APPROACH

Working groups, composed of representatives from the Armor Center and HumRRO, in coordination with the Armor School, approached the task in four phases: development of task inventories for each MOS, development of training objectives for each task, development of performance measures for each objective, and assessment of performance-oriented revisions of training content and methods for each training program.

The original task inventories listed all tasks addressed in the existing Army Subject Schedules and lesson plans, plus additional tasks determined by Armor Center personnel to be appropriate for entry-level performance. Initially, 255 tasks were identified for Reconnaissance Specialist (MOS 11D) and 242 tasks for Armor Crewman (MOS 11E). Following review for entry-level requirements, task inventories were reduced to 101 tasks for 11D and 106 for 11E. Training objectives were developed and translated into performance measures which were reviewed and re-written by subject matter experts. The resulting measures were aggregated into 52 performance tests for 11D and 63 performance tests for 11E. The two training programs were revised to include the identified training objectives and performance measures.

The two programs were field tested at the Armor Training Center. The 11D program was refined through the conduct of successive training cycles for 10 reconnaissance troops, and the 11E program was administered to 14 successive cycles of armor companies. The approximate numbers of trainees involved were 1,000 and 2,000 respectively.

Program assessment consisted of: observation of classes to identify where revision of lesson plans was required; administration of mid-cycle and end-of-cycle performance examinations; and collection of trainee and instructor attitude data. Data from the

observations, examinations, and attitude surveys were used in a continuing refinement of training content and methods.

FINDINGS

1. Conduct of these training R&D activities in an operational training setting resulted in continuing heavy workloads on trainers, high frustration levels, project delay and stretch-out, and a significant lessening of the control over input and administrative variables that is customarily assumed to characterize rigorous research practice.

2. Performance data and training observation disclosed that iterative program refinement over ten successive troop training cycles resulted in steady improvement of the 11D program (first time percent pass rates on mid-cycle tests starting at approximately 60 percent, increasing to approximately 90 percent; first time percent pass rates on end-of-cycle tests starting at approximately 80 percent, increasing to approximately 95-100 percent).

3. Similar performance data and training observation disclosed that intensive efforts to refine the 11E program prior to field test produced such an effective program that few refinements were required over the course of 14 successive company training cycles (first time percent pass rates on mid-cycle tests starting at approximately 85 percent, increasing to approximately 95 percent; first time percent pass rates on end-of-cycle tests starting and remaining at approximately 90-95 percent throughout).

4. Trainees and instructors generally expressed confidence in both programs and in the quality of program output.

CONCLUSIONS

1. Conducting large-scale training R&D and effecting institutional change in Army field training operations is arduous and time-consuming. Constant monitoring of the system under study, coupled with a flexible approach to research design and experimental control are essential, if priority operational requirements are not to negate the effort.

2. The incorporation of performance-oriented training concepts and techniques into Armor Advanced Individual Training Programs produces graduates with demonstrated high levels of skill as entry level reconnaissance specialists and armor crewmen.

3. Such programs are cost/effective in that they can be

implemented without increasing the personnel, time, and facility costs of training.

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PREFACE

HumRRO Work Unit ATC-PERFORM was initiated in 1972 to assist the Army in a continuing review, evaluation, and refinement of performance-based training in Army Training Centers. As part of ATC-PERFORM, a study was conducted to develop, field test, and assess the effects of performance-oriented revision of the Armor Reconnaissance Specialist and Armor Crewman Advanced Individual Training (AIT) Programs at Fort Knox, Kentucky, during FY 73-75.

Work Unit ATC-PERFORM has been conducted by the HumRRO Western Division, of which Dr. Howard H. McFann is Director. Dr. John E. Taylor was the Work Unit Leader. The Armor AIT study was conducted successively by Mr. G. Gary Boycan, Mr. J. Patrick Ford, and Dr. Douglas L. Young, all of the HumRRO Central Division at Fort Knox. Mr. William L. Warnick and Mr. James H. Harris provided assistance on the project. Administrative and logistical support for the study, as well as assistance by enlisted personnel, were provided by the US Army Research Institute Field Unit, commanded by LTC Willis Pratt.

Field support for this study was provided by the First Brigade, US Army Armor Center, under the command of COL Hillman Dickinson, then COL Rodney D. Renick, and recently COL Philip L. Bolte, whose officers and enlisted men contributed greatly in developing and refining the performance-oriented training programs. The efforts of LTC Gordon L. Stone and the Fifth Cavalry Squadron were particularly noteworthy for their hard work and professional field test of the first revised program.

HumRRO research on ATC-PERFORM was conducted under DAHC19-73-C-0004, under the sponsorship of the US Army Research Institute for the Behavioral and Social Sciences, with Dr. Otto Kahn serving as the technical monitor. Training research is conducted under Army Project 2Q062107A745.

Meredith P. Crawford
President
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BACKGROUND

During the first phase of the Army's conversion to an all-volunteer status, the Experimental Volunteer Army Training Program (EVATP) was developed and field tested for Basic Combat Training (BCT) and Advanced Individual Training (AIT) Infantry in January 1971. This training system identified critical subject skills and knowledge, stated course and subject objectives in performance terms, prepared performance tests, established "hands on" instructional techniques, and implemented quality control practices. The EVATP produced graduates who performed at significantly higher levels than graduates of the conventional program.[1]

TRADOC subsequently directed that all training programs conducted in Army Training Centers be reviewed and revised. Program revisions were to be based upon the results of systems engineering of training, performance-oriented training, and other actions having implications for such revisions. Performance-oriented instruction and testing were to be incorporated wherever feasible and HumRRO technical assistance was to be used during revision or redesign of instruction.

Work Unit ATC-PERFORM provided technical R&D assistance to the Armor Training Center, Fort Knox, Kentucky, in revising and refining two ongoing Advanced Individual Training (AIT) Programs, Reconnaissance Specialist (MOS 11D) and Armor Crewman (MOS 11E). These programs were selected for attention because they train entry-level soldiers for critical and high-density armor MOS.

PURPOSE

The purpose of the Armor sub-effort of Work Unit ATC-PERFORM at Fort Knox was to assist the USA Armor Center in the refinement of MOS-related training in the two Armor AIT programs, with particular emphasis on performance-based training and testing. These courses are conducted by the First Brigade of the Armor Training Center under proponency of the Armor School.

Specifically, the work undertaken was the development of performance training objectives stated in measurable terms, the translation of these objectives into GO/NO-GO tests for assessing

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[1] John E. Taylor, Eugene R. Michaels, and Mark F. Brennan, *The Concepts of Performance-Oriented Instruction Used in Developing the Experimental Volunteer Army Training Program*, HumRRO Technical Report 72-7, March 1972.

training attainment, and the modification of training content and methods, where appropriate, to incorporate the principles of performance-oriented instruction.[1]

It was proposed to conduct the work in coordination with personnel of the Armor School and Training Center. Experimental work (data collection, utilization of trainees and cadre, modifications in training operations,...) were to be accomplished in the context of the First Brigade's ongoing training operations and were not to interfere with or interpose obstructions to the continued flow of trainees through the training base.

APPROACH

Working groups of Armor Center and HumRRO representatives, working in coordination with the Armor School, completed the project in the following four phases:

1. Development of a task inventory for each MOS.
2. Development of training objectives for each task.
3. Development of performance measures for each objective.
4. Field refinement of performance-oriented revision of training methods and content for each program.

The activities of each phase are described in the following sections.

DEVELOPMENT OF TASK INVENTORIES

This phase was initiated at the beginning of FY 73 and completed during the second quarter. Major problems encountered here were with the large number of tasks in each MOS and differences between tasks of the MOS. The Training Center Project Officer, Assistant S-3 (11E), Assistant S-3 (11D), NCO instructors, and HumRRO representatives reviewed the Army Subject Schedules and lesson plans to identify the tasks currently addressed in training.

The officers and senior NCOs in the working group added to these lists tasks which their experience and the results of systems engineering indicated to be required of an entry-level MOS incumbent in an armor or reconnaissance unit.

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[1]See TRADOC Pamphlet 600-11, "Guidelines for the Conduct of Performance Oriented Training," 22 October 1973.

The group then coded each task to indicate which of the following levels of proficiency was required of an incumbent:

1. Completely qualified.
2. Able to perform complete task under some conditions.
3. Knows about task procedure.
4. Basic orientation awareness.

As a final step, the task lists were screened to identify those tasks most critical for an entry-level soldier which could be taught within the time and equipment constraints imposed upon the AIT programs.

DEVELOPMENT OF TRAINING OBJECTIVES

Late in the second quarter of FY 73, the working group undertook the development of performance objectives and standards to define entry-level requirements for the selected tasks. Work on this phase extended into the first quarter of FY 74.

The objective prepared for each task explicitly stated the behavior to be performed, the task performance conditions, and the performance standard(s). Behaviors expected of trainees were briefly described in performance terms. Conditions of performance were described by stating the circumstances under which the tasks must be performed. Standards stated the steps required for task performance and the time limitations (when appropriate) within which the tasks must be successfully performed. When time limits were not specified in published doctrine, the subject-matter experts on the working group derived from their experience reasonable times for entry-level task performance under the stated conditions.

DEVELOPMENT OF PERFORMANCE MEASURES

Work on performance measures and tests was started in the fourth quarter of FY 73 and completed in the second quarter of FY 74. The working group translated the training objectives for each task into GO/NO-GO test items. Performance conditions were described in detail to enable test administrators to construct the test environment in a way that would approximate the job context as closely as possible.

To facilitate test administration, items for related objectives were grouped into tests, suitable for publication as a pocket-size book. The book could then serve to facilitate training and job performance.

As performance tests for each subject area were developed, they were reviewed by the appropriate instructional department of the Armor School, the training brigade and battalion personnel for accuracy of the behavioral measures, appropriateness of time limits, feasibility of test conditions, and appropriateness of each task for inclusion in the program of instruction.

Mid-cycle diagnostic examinations and end-of-cycle criterion examinations were prepared by selecting tests from those that had been developed by the working group and which were feasible for administration within resource capabilities. Critical task performance measures were included in these selected tests.

REVISION AND REFINEMENT OF PROGRAMS

This extensive phase was conducted in late FY 74 and early FY 75. To ensure that training would be performance-oriented, all lesson plans for both AIT programs were reviewed in detail and, where appropriate, revised in accordance with performance training principles specified by TRADOC Pam 600-11. This was a time-consuming activity requiring close interaction among HumRRO and training center personnel. Throughout, lesson plans were revised as follows.

All instruction was recast so as to be functional and job-task relevant. Attempts were made to break the large-group, lock-step mode of instruction by conducting instruction in the smallest groups that instructor density would permit, and by providing individualized instruction on the more difficult skills. Verbal presentations by instructors were sharply curtailed and the balance of class time was devoted to "hands-on" practice by the trainees toward attainment of the GO/NO-GO standards specified by the performance tests. Practice sessions were designed to include close interaction with instructors so that both trainees and instructors would be given frequent feedback on the progress being made toward achieving the performance standards. Provision was made for faster learners to assist the slower learners.

Field Test of Reconnaissance Specialist Program (MOS 11D)

Field test of the new Reconnaissance Specialist Program began in May 1974. Continuous program revision continued through, and was based upon the findings of the training cycles for ten training troops (approximately 1,000 trainees). These activities are described below.

Class observations and student interviews. HumRRO personnel monitored all classes, and informally interviewed trainees during

the training cycles. Any specific problems in the instructional process were noted. For example, trainees would discuss problems they encountered, such as lack of readily available training aids, too little or too much practice time, inadequate demonstrations, too much lecturing, being rushed through training, and so on.

Results of class observations and student interviews were discussed in weekly meetings with the squadron and troop commanders. These discussions led directly to appropriate changes in the lesson plans and training schedule before succeeding troops entered training.

Administration of examinations. The first attempt to administer the mid-cycle examination suffered administrative problems, *e.g.*, trainee flow from station to station was interrupted, too much time was wasted in waiting, instructors did not understand how to administer certain performance measures, and items of necessary equipment were unavailable. These problems were resolved and appropriate refinements were made in testing procedures. Testers were trained in the revised procedures and were ready to administer tests to the second and succeeding troops.

After testing procedures had "shaken down" in the first two cycles, numbers of "GOs" and "NO-GOs" on first test and retest were tabulated routinely for each performance measure. As successive troops proceeded through the system, these data were examined to determine which performance measures were presenting difficulties to the trainees, and what training refinements were required.

Similar difficulties were encountered in initial administration of the end-of-cycle performance examination. Here, too, examination of data led directly to the solution of test administration problems and to the refinement of instructional techniques as successive troops proceeded through training.

Mid-cycle and end-of-cycle performance examination data were collected on a total of ten training troops.

Attitude questionnaires. Following end-of-cycle examinations, questionnaires were administered to trainees and instructors to determine their perceptions of the developing training program. These questionnaires were administered solely to supplement the other information being gathered upon which program refinement and problem solution were to be based. Attitude development and assessment were not being studied in the formal sense.[1]

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[1]Questionnaires used to sample trainee and instructor reactions to the performance-oriented programs are contained in the Appendix.

Field Test of Armor Crewman Program (MOS 11E)

Developmental Work Preceding Field Test. Performance measures were pilot-tested by administering them to trainees who had received the appropriate related instruction during training under the conventional program. Twenty-four performance measures could not be so evaluated because instruction in these tasks was not being offered as part of the conventional Program of Instruction (POI). Tank commanders, drill instructors, subject-matter experts and HumRRO personnel reviewed the pilot-tested measures, and appropriate changes in conditions and standards were made.

All lesson plans were reviewed in detail and re-written by personnel of the two training battalions and the POI committee. Several review-rewrite loops involving brigade, HumRRO, and battalion training personnel eventually resulted in a complete set of revised lesson plans for field test.

Field test of the new Armor Crewman Program began in July 1974. As with the 11D program, revision continued through, and was based upon the findings of, the training cycles for 14 Armor training companies (approximately 2,000 trainees). Following is a description of these activities.

Class observations. As was the case in the 11D program, monitoring of classes over time identified areas of instruction needing further attention. For example, instructors tended to lecture trainees and unnecessarily extend demonstrations, even though practical exercises were available to provide practice on the training tasks. In such specific cases, guidance was provided on how to reduce demonstration time and begin trainee practice earlier in the class period.

Many such refinements were made over the course of the field test.

Administration of examinations. The mid-cycle examination presented no problems in administration in that it had been pilot-tested prior to field test use.

The new end-of-cycle examination could not be included in the field test with the first four companies to go through the program. A major administrative problem occurred in that the new examination procedures required that no instructors from the company being tested would be used as testers of their own trainees. Requests for testers from other companies could not be met and compromise was eventually attained by using testers from the POI Committee, brigade maintenace pool, and some from the company being tested.

As a result, the earliest end-of-cycle performance data available were obtained from the fifth company. Data on trainee performance from the sixth, seventh, and eighth companies were examined to determine where initial refinement in the training program was necessary.

After the fifth company, only spot checks of mid-cycle examination data were found to be required. End-of-cycle examination data for all subsequent companies were reviewed to determine where further changes were necessary.

Attitude questionnaires. After their end-of-cycle examinations, trainees from the first three companies were administered the same questionnaire that had been administered to the 11D program trainees. Instructors of the first and third companies also responded to the questionnaire which had been administered to the 11D instructors.

RESULTS AND DISCUSSION OF ALL PHASES

TASK INVENTORIES, TRAINING OBJECTIVES AND PERFORMANCE TESTS

In the 11D course, 235 job-tasks were identified in the lesson plans, and 20 others were identified by the working group as potentially desirable. Further analysis reduced the total of 255 to 101 for inclusion in the training program.

In the 11E course, 225 tasks were identified in the lesson plans, and 17 others not in the lesson plans were identified as desirable. Further analysis reduced the total of 242 to 106 for inclusion in the training program.

These task lists for 11D and 11E, together with their assigned proficiency levels are reported in a HumRRO Consulting Report.[1]

Many of the tasks were found to be compound, consisting of two or more related tasks. For example, the 11D task, "Enter/leave radio net," is actually two tasks—one for entering and one for leaving. The 11E task, "Fire the main gun," actually consists of 16 related tasks, each requiring a separate objective statement. These tasks were separated before training objectives were prepared. Analysis led to the development of 151 training objectives for 11D and 195 for 11E.

When training objectives were translated into performance measures, and grouped into tests by subject, the total numbers of performance tests that emerged were 52 for 11D and 63 for 11E. Tables 1 and 2 summarize the distributions of tasks, objectives and tests. These training objectives and tests, including conditions and standards, are reported in two HumRRO Consulting Reports.[2]

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[1] G. Gary Boycan and William L. Warnick. *Training Requirements for the Armor Crewman and Reconnaissance Specialist Advanced Individual Training Programs*, Consulting Report, Human Resources Research Organization, November 1972.

[2] J. Patrick Ford, James H. Harris, and Peter F. Rondiac. *Performance Measures for AIT Armor Crewman*, Consulting Report, Human Resources Research Organization, April 1974.

James H. Harris, J. Patrick Ford, and B. B. Bell, III. *Performance Measures for AIT Reconnaissance Specialist*, Consulting Report, Human Resources Research Organization, April 1974.

TABLE 1. DISTRIBUTION OF 11E TASK INVENTORIES, TRAINING OBJECTIVES, PERFORMANCE MEASURES, AND TESTS BY MOS SUBJECT

MOS SUBJECT	Task Inventory		Training	Performance	
	Original	Final	Objectives	Measures	Tests
Maintenance Services	41	13	15	15	6
Driving	33	17	32	27	6
Communications	22	7	20	17	5
Weapons	39	33	52	35	14
Gunnery	81	36	76	72	32
Tactical Training	26	0	0	0	0
Total	242	106	195	166	63

TABLE 2. DISTRIBUTION OF 11D TASK INVENTORIES, TRAINING OBJECTIVES, PERFORMANCE MEASURES, AND TESTS BY MOS SUBJECT

MOS SUBJECT	Task Inventory		Training	Performance	
	Original	Final	Objectives	Measures	Tests
Communications	27	8	19	19	6
Driving and Maintenance Services	56	23	35	28	11
Map Reading/ Land Navigation	13	20	23	19	10
Demolitions	35	5	5	5	3
Individual Weapons	12	0	0	0	0
Automatic Weapons	52	29	46	45	12
Tactical Training	46	14	21	21	9
Indirect Fire	14	2	2	2	1
Total	255	101	151	139	52

Revised Army Subject Schedules 17-11E10 and 17-11D10, including the new performance tests were sent to TRADOC in January 1974. TRADOC approved the ASubjScds for use in the subsequent field tests.

FIELD TEST OF 11D PROGRAM

11D Examination Data

General trends in the data and selected examples of how findings were used to solve program problems are presented in this section. Summary troop performance data are presented in Table 3 and Figure 1. Not all performance measures were administered in both examinations. The blank sections of Table 3 reflect this. Mid-cycle data were eliminated for the first troop because of the administrative problems noted above.

On the early mid-cycle tests, "transmitting a message" was one of the two most difficult performance measures (see Table 3). Trainees either forgot to identify themselves or forgot to use the phonetic alphabet to spell abbreviations. The first troop experienced the same problems on their end-of-cycle test. Lesson plans for the communications classes were overhauled to include: (1) practice by the trainees with frequent feedback to them, (2) a two-hour practical exercise in the third week as a review, and (3) use of communications procedures in tactical training and indirect fire requests. These and similar changes contributed to increased proficiency by the fourth through tenth troops on the communications performance measures on both the mid-cycle and end-of-cycle examinations (see Table 3).

Another example of a difficult mid-cycle performance measure for the trainees of early troops was "filling out DA Form 2408-1." The solution was to alter class procedure to ensure that each trainee practiced filling out this form and DA Form 2404. The use of less important forms was only demonstrated, and the time saved was added to the practice time for Forms 2408-1 and 2404. Continued emphasis in training on these forms, given to all troops, resulted in their executing the forms satisfactorily during their end-of-cycle examinations (again, see Table 3).

Map reading performance measures were also demonstrated to be difficult for the early troops on the mid-cycle test. Because map reading instruction had been dropped from Basic Combat Training at some training centers, approximately half of the trainees had not been trained in this skill. Therefore, trainees who had previously acquired map reading skills, or who developed them rapidly, served as peer instructors for other trainees. A careful review of instructional materials disclosed handouts that were hard to read;

TABLE 3. 11D FIRST TEST "GO" RATES ON PERFORMANCE MEASURES OF MID-CYCLE AND END-OF-CYCLE EXAMINATIONS BY MOS SUBJECT

MOS Subject: Performance Measure	Mid-Cycle of Troops 2,3,4	Mid-Cycle of Troops 5,6,7,8,9,10	End-of-Cycle of Troops 1,2,3,4	End-of-Cycle of Troops 5,6,7,8,9,10
Communications:				
Into operation	.79	.90	.91	.97
Enter net	.87	.95		
Radio Check			.81	.93
Transmit message	.44	.87	.80	.94
Record message			.91	.96
Leave net	.88	.98		
Driving and Maintenance Services:				
Starting M151	.96	.94		
Driving M151	.94	.90		
Stopping M151	.95	.96		
DA Form 2404	.84	.87	.95	1.00
Operator's manual	.82	.97		
Lubrication order			.93	.99
Before operations checks			.89	1.00
After operations checks			.92	1.00
DA Form 2408-1	.60	.82	.96	.97
Map Reading:				
Military symbols	.57	.62		
Terrain features	.51	.55		
Plotting	.68	.72		
Road distance	.44	.54		
Demolitions:				
Electrical			.94	.98
Non-electrical			.94	.98
Automatic Weapons:				
Clear M60	.87	.86	.83	.93
Disassemble M60	.93	.97	.94	.99
Assemble M60	.67	.75	.78	.96

MOS Subject:	Mid-Cycle of Troops		End-of-Cycle of Troops	
Performance Measure	2,3,4	5,6,7,8,9,10	1,2,3,4	5,6,7,8,9,10
Tactical Training:				
Bridge report			.89	.97
Tracking			.77	.92
Indirect Fire Request:				
Visual search			.98	1.00
Spot report			.96	1.00
Initial request			.95	.99
Subsequent request			.94	1.00

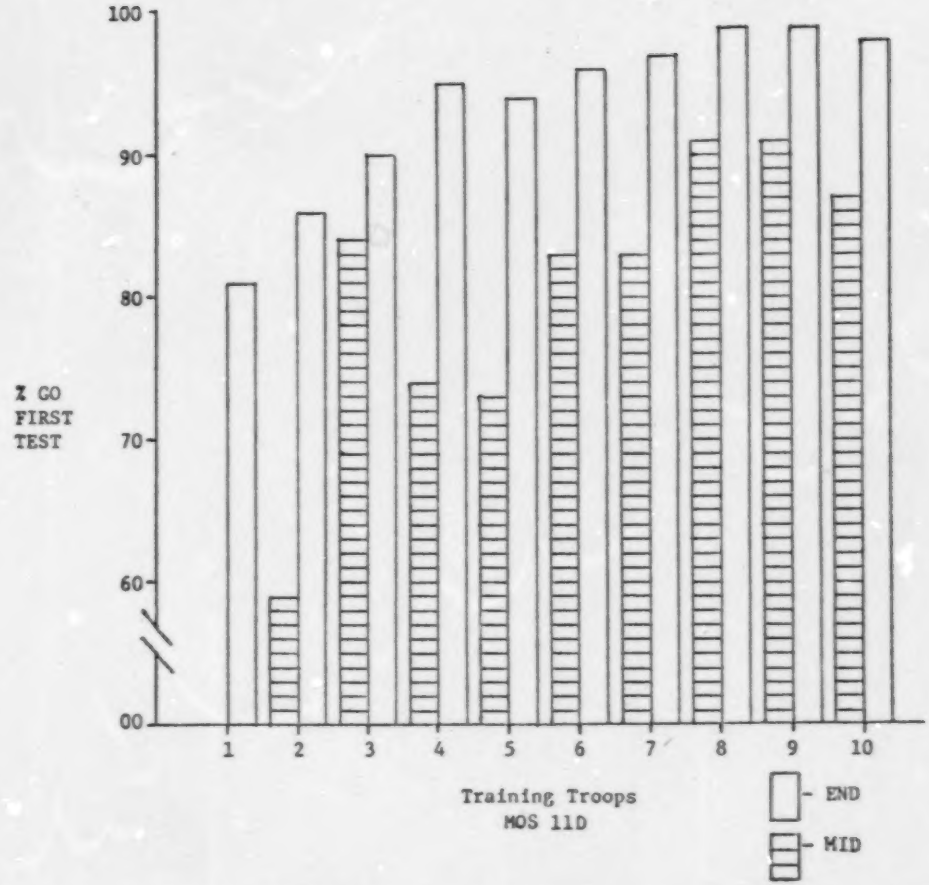

Figure 1. Percent "GO" First Test on Mid-Cycle and End-of-Cycle Examinations of the Training Troops

this may have accounted for poor learning. These materials were redrawn prior to their subsequent use.

An example of a relatively simple problem to remedy, was found during the first troop's end-of-cycle test. Over half of the trainees were NO-GO in "tracking." The cadreman who conducted the tracking test found that trainees could not judge the age of tracks. This finding led to a minor modification in the tracking lesson plan which stressed estimating age of imprints.

Two weeks after the first troop's end-of-cycle test, mid-cycle data from the third troop and end-of-cycle data from the second troop were available. Proportion of first-time GOs was greater for the third than the second troop's mid-cycle test. They had less trouble transmitting a message, filling out DA Form 2408-1 and using the operator's manual, all tasks which had been difficult for the second troop. GO rates were not much greater on the map reading performance measures, but it was found that over three-quarters of the NO-GO trainees became GOs when retested following critique of their performance.

Overall end-of-cycle performance of the second troop was found to be somewhat better than that of the first troop. The GO rate on "tracking" and "transmitting a message" had improved considerably. Performance improvements probably reflected more in-class "testing" in the second troop which had been introduced to provide feedback.

As noted earlier, mid-cycle diagnostic examinations of the earlier troops clearly indicated major difficulties in the training program. The first column in Table 3 indicates where problems occurred. The remaining column of mid-cycle and both columns of end-of-cycle examination scores reflect the cumulative effect of corrective revisions in the program.

Generally, the impact of training revisions was substantial as reflected by the differences between the earlier and later mid-cycle scores (columns 1 and 2 in Table 3). Test performance increases on successive end-of-cycle examinations were smaller compared to those on the mid-cycle tests because early troops registered high end-of-cycle GO rates. Consequently, there was less requirement for improvement (columns 3 and 4, Table 3).

Overall troop percent GO first-test scores for each of the 10 troops are plotted in Figure 1. The progressive improvement in both mid-cycle and end-of-cycle performance over the course of the field test is clear. Mid-cycle performance began at about 60 percent and increased to about 90 percent. End-of-cycle performance began at about 80 percent and leveled off close to the maximum.

11D Attitude Questionnaire Results

Responses to the questionnaire by MOS 11D trainees were generally favorable throughout the course of the field test. They liked "hands-on" training and were confident in their ability to perform. They reported that explanations and demonstrations were clear and that the level and length of explanation was about right. In the area of skill practice they indicated that instructors provided good coaching, that sometimes trainees provided peer instruction, and that more practice time was usually provided for trainees who needed it. Trainees also perceived the performance tests to be valid indicators of their proficiency. Responses to questions on self-pacing were neutral. Overall, the training program was evaluated favorably by the trainees.

When asked to compare the revised program with the conventional program, many early troop instructors indicated that they worked harder, that their motivation and morale were lower, and that more time was wasted in the new program. These initial negative attitudes probably reflected the difficulties attending the initiation of the new program. Instructors did have to work hard to write and implement new lesson plans; frequent instructional changes were frustrating; and, incomplete and incorrect lesson plans added to the frustration and led to wasted time.

Other early troop instructors thought trainees learned more in the revised program than they did in the conventional program. They reported their own motivation and morale were about the same, that less not more time was wasted, and that use of resources was more efficient. However, all instructors agreed that they worked harder in the revised program.

Over the course of the field test, as the system "shook down" administratively, and as trainee performance steadily improved, cadre attitudes also became more positive.

FIELD TEST OF 11E PROGRAM

11E Examination Data

General trends in the data and one example of how findings were used to define program problems are presented in this section. Summary company performance data are presented in Table 4 and Figure 2. As was the case in the 11D program, not all performance measures were administered in both the mid- and end-of-cycle examination. The blank sections of Table 4 reflect this. No end-of-cycle data could be collected for the first four training companies as noted above. Mid-cycle data are missing for companies 6, 7, and 12 because

TABLE 4. 11E FIRST TIME "GO" RATES ON PERFORMANCE MEASURES OF MID-CYCLE AND END-OF-CYCLE EXAMINATIONS BY MOS SUBJECT

MOS Subject: Performance Measure	Mid-Cycle of Companies 1,2,3,4,5,8	Mid-Cycle of Companies 9,10,11,13,14	End-of-Cycle of Companies 5,6,7,8	End-of-Cycle of Companies 9,10,11,12,13,14
Maintenance Services:				
DA Form 2404	.52	.85	.84	.78
Operator's manual	.86	.98		
Before operations checks	.70	.92	.92	.89
After operations checks	.74	.99	.92	.89
DA Form 2408-1	.43	.77	.82	.73
Lubrication order	.78	.98	.96	.96
Driving:				
Start tank	.92	1.00	.86	.89
Respond to ground guide	.94	1.00		
Turning	.98	.99		
Backing	.97	.99		
Cross ditches	.98	1.00		
Shift while moving	.98	.99		
Stop	.98	.98	.82	.84
Respond to TC's commands	.98	.98		
Ground guide	.94	1.00		
Communications:				
Into operation	.92	.94	.95	.94
Enter net	.84	.95		
Radio check			.96	.92
Transmit message	.82	.88	.97	.94
Leave net	.94	.97		

MOS Subject: Performance Measure	Mid-Cycle of Companies 1,2,3,4,5,8	Mid-Cycle of Companies 9,10,11,13,14	End-of-Cycle of Companies 5,6,7,8	End-of-Cycle of Companies 9,10,11,12,13,14
Weapons:				
Clear pistol	.89	.91		
Disassemble pistol	.94	.93		
Assemble pistol	.86	.82		
Check pistol safeties	.94	.92		
Load clip	.98	.98		
Load pistol	.88	.92		
Pistol immediate action	.81	.77		
Clear M73			.89	.91
Disassemble M73			.91	.90
Assemble M73			.88	.84
Gunnery:				
Identify ammunition			.98	.97
Replenisher tape			.96	.96
Turret into operation			.96	.97
Unload misfire			.98	.98
Unload with extractor			1.00	.99
Faulty ammunition			1.00	.98
Remove or install breech block			.95	.95
Disassemble or assemble breech block			.95	.96
Primary sight, stationary target			.99	.98
Primary sight, stationary target,BOT			.99	.98
Secondary sight, stationary target			.99	.92
Secondary sight, stationary target,BOT			.99	.94
Primary sight, moving target			.98	.92
Primary sight, moving target,BOT			.98	.96

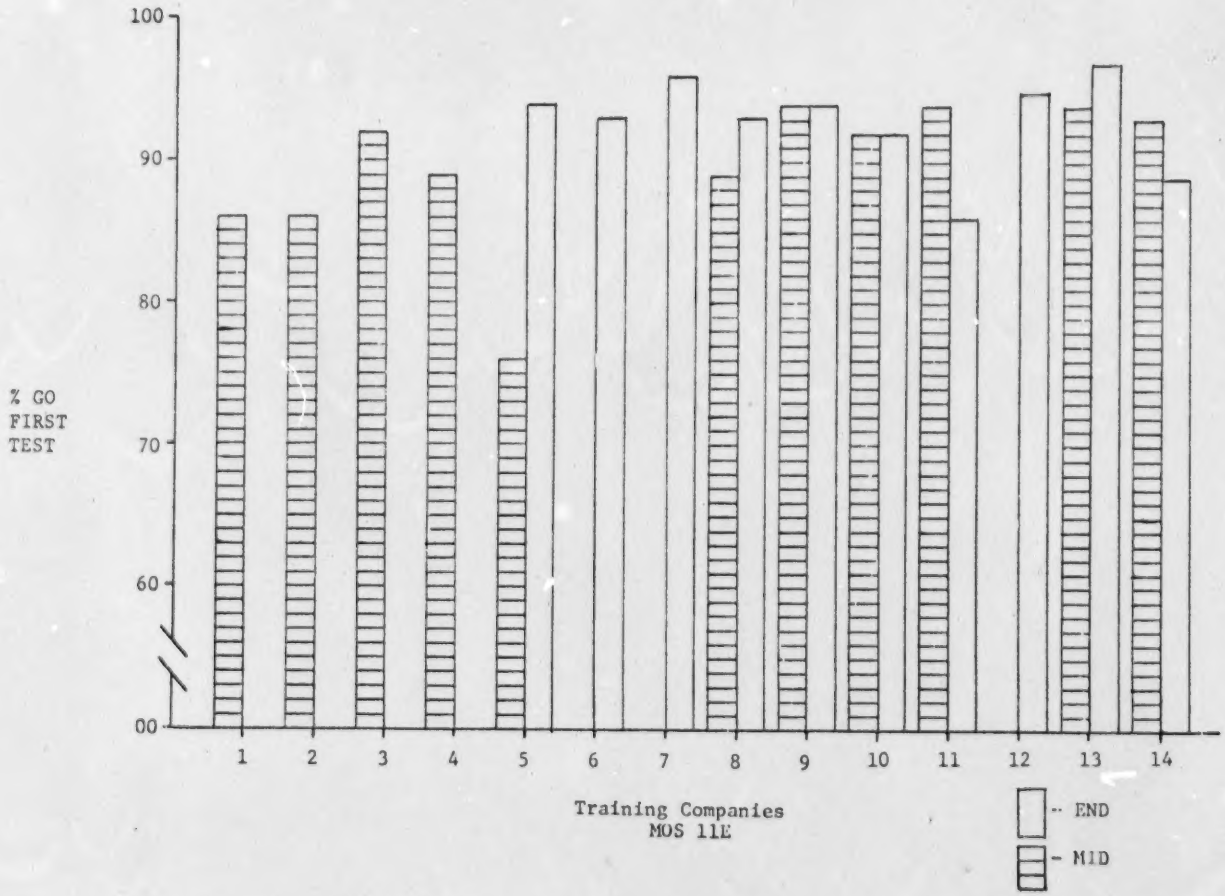

Figure 2. Percent "GO" First Test on Mid-Cycle and End-of-Cycle Examinations of the Training Companies

unanticipated operational problems (scheduling, weather, overriding priorities) curtailed testing time, modified test conditions, or otherwise contaminated the scores.

The data clearly show that overall the 11E program proved to be much less in need of refinement than did the 11D program. Early cycles performed almost as well as did the later cycles on the mid-cycle examination. Early cycles performed as well as, or even somewhat better than, the later cycles on the end-of-cycle examination. Thus, the progressive improvement exhibited by the 11E training troops did not occur over the course of the 11E field test. Training companies started out performing well and continued to do so. This is taken to reflect the intensive preparations made jointly by HumRRO and ATC personnel to perfect training and testing techniques immediately prior to initiating the 11E field test.

11E Attitude Questionnaire Results

The responses of 11E companies were even more favorable to their training than were those of the 11D troops. They enjoyed "hands-on" training, were quite confident in their proficiency, and indicated that they thought almost all tests were valid indicators of that proficiency. Though they found the demonstrations and explanations to be clear, they noted that instructors tended to talk too much. Trainees indicated that they usually had enough practice time, that instructors provided coaching during practice, and allowed peer instruction. Additional practice time was made available to trainees who needed it. Pace of instruction seemed to be open to question. Sizeable numbers of trainees indicated that they were tested or checked out before they were ready, but that faster or slower learners were allowed, more likely than not, to proceed through the course at their own rate.

When asked to compare the new program with the conventional program, first and third company instructors indicated that they worked harder, that their motivation and morale were lower, and that more time was wasted in the revised program. Based on these indicators and on instructor complaints that the week of instruction devoted to driving required too many overtime hours, the driving and maintenance parts of the mid-cycle examination were integrated with driving instruction.

Both groups of instructors indicated that trainees learned more in the new program. Trainee and instructor attitude data collected after the end-of-cycle examinations did not identify any additional problems that had not already surfaced in their comments during training or in the performance tests.

FINDINGS AND REFLECTIONS

The requirement to undertake the activities reported here under the conditions imposed was a prodigious one. Personnel turnover and higher priority duties at the Armor Center were a source of frustration and resulted in frequent delays in accomplishing the first three phases. The requirement to convert these two programs during the course of ongoing training operations without obstructing training presented insoluble problems of research design, experimental control and project management. The training brigade's mission of providing an uninterrupted stream of MOS qualified 11D and 11E graduates had to take precedence, and it did. Time and time again, troop and company commanders' decisions made in the execution of their myriad responsibilities required compromise of R&D needs.

Over time, the two programs did come about, albeit with a wide turning radius. The hoped-for instituting of performance-oriented training techniques progressed as: (1) training and testing techniques were defined, (2) standards for performance became more firmly understood and established, and (3) performance, observations, and attitude data were fed back into the programs indicating areas where further attention was needed. Happily, most of this was accomplished for the 11E program before the field test was launched.

Performance test and observational data, in addition to reflecting improved system functioning from cycle-to-cycle, indicated that, generally, the performance-based techniques were producing 11D and 11E graduates with high levels of skill over a range of critical tasks. Trainee and cadre attitudes reflected confidence in the same. The two programs were cost/effective in that these high skill levels were achieved with no increase in training base cadre, facility, or time costs.

As other studies conducted in operational settings have shown, the accomplishing of institutional change is time-consuming and difficult in a large training center. This is so for a number of reasons: (1) the training load is heavy, (2) ongoing operational training activities have precedence and must not be interrupted, (3) demands on the time of training staff are already heavy, and (4) turnover among training personnel is high. When such conditions prevail quick conversion to new instructional techniques cannot be expected. Rather, conversion occurs over extended periods of time in a somewhat incremental fashion. Further, close monitoring of the system undergoing revision must be maintained to assure that planned innovations are incorporated, and that once incorporated they do not "wash out."

APPENDIX

Questionnaires Used to Sample Trainee and Instructor Attitudes Toward the Performance-Oriented Programs

11D AND 11E TRAINEE QUESTIONNAIRE

NAME_____
Last First MI

Social Security No. _____Unit_____

Check one answer for each question which is closest to the way you feel about the course.

1. Did the instructor explain clearly what you were expected to learn in his class?

____All the time
____Most of the time
____Some of the time
____A few times
____None of the time

2. How many of the demonstrations clearly showed what you were supposed to learn?

____All
____Most
____Some
____Few
____None

3. How much talking did the instructor do before you were allowed to perform the task?

____Far too much
____Slightly too much
____About right
____Slightly too little
____Far too little

4. Did you usually have enough practice time?

____Yes
____No

5. How often did an instructor assist you when you needed help during practice?

____Always
____Usually
____Sometimes
____Seldom or never
____I never needed help

6. How often were you tested or checked out before you were ready?

____Never
____Seldom
____Sometimes
____Often
____Always

7. How many times did you help others learn a task?

____Many times
____A few times
____Never

8. How often were students given more time to practice when they needed it?

____Always
____Usually
____Sometimes
____Seldom
____Never

9. How many of the performance tests really checked what you were supposed to learn?

____All
____Most
____Some
____Few
____None

10. How often were the faster or slower learners allowed to move through the course at their own rate?

____Always
____Usually
____Sometimes
____Rarely
____Never

11. How well do you like this type of training?

____I like it a lot
____I like it somewhat
____I neither like it nor dislike it
____I dislike it somewhat
____I dislike it a lot

12. What two things did you like most about this type of training?

1. _____
_____

2. _____
_____

13. What two things did you dislike about this type of training?

1. _____
_____

2. _____
_____

14. How many of the tasks which you learned do you think you perform well?

____All
____Many
____Some
____Few
____None

35

11D AND 11E AIT INSTRUCTOR QUESTIONNAIRE

In the following statements, please check the one answer which is closest to the way you feel or is closest to the correct information. This information will not be analyzed individually; therefore, please answer all questions truthfully.

1. How does the New Program compare with the Older Program as to the amount of material students actually learn?

___ Students learn much more in the New Program
___ Students learn a little more in the New Program
___ Students learn about the same amount in both programs
___ Students learn a little less in the New Program
___ Students learn much less in the New Program

2. How does the New Program compare with the Older Program as to motivation and morale of students?

___ Student motivation and morale are much higher in the New Program
___ Student motivation and morale are a little higher in the New Program
___ Student motivation and morale are about the same in both programs
___ Student motivation and morale are a little lower in the New Program
___ Student motivation and morale are much lower in the New Program

3. How does the New Program compare with the Older Program as to work load of the CADRE/NCOs?

___ The CADRE/NCO's work is much heavier in the New Program
___ The CADRE/NCO's work load is a little heavier in the New Program
___ The CADRE/NCO's work load is about the same in both programs
___ The CADRE/NCO's work load is a little lighter in the New Program
___ The CADRE/NCO's work load is much lighter in the New Program

4. How does the New Program compare with the Older Program as to the motivation and morale of CADRE/NCOs?

___ CADRE/NCO's motivation and morale are much higher in the New Program
___ CADRE/NCO's motivation and morale are a little higher in the New Program
___ CADRE/NCO's motivation and morale are about the same in both programs
___ CADRE/NCO's motivation and morale are a little lower in the New Program
___ CADRE/NCO's motivation and morale are much lower in the New Program

5. How does the New Program compare with the Older Program as to the amount of time that is wasted?

___ Far more time is wasted in the New Program
___ A little more time is wasted in the New Program
___ About the same amount of time is wasted in both programs
___ A little less time is wasted in the New Program
___ Far less time is wasted in the New Program

Please explain:

6. How does the New Program compare with the Older Program as to the efficient use of equipment and other resources?

___ The New Program is far more efficient
___ The New Program is a little more efficient
___ They are about equally efficient
___ The New Program is a little less efficient
___ The New Program is far less efficient

7. If I were in an Armor unit in the field, I would be happy to have any USATCA graduate assigned to my platoon.

___ Agree completely
___ Agree moderately
___ Undecided
___ Disagree moderately
___ Disagree completely

8. Most of what is taught in USATCA is need-to-know information.

___ Agree completely
___ Agree moderately
___ Undecided
___ Disagree moderately
___ Disagree completely

9. Once a trainee has passed a test, he should be used to help another trainee who is having trouble.

___ Agree completely
___ Agree moderately
___ Undecided
___ Disagree moderately
___ Disagree completely

10. Trainees get little benefit by helping each other to learn.

___ Agree completely
___ Agree moderately
___ Undecided
___ Disagree moderately
___ Disagree completely

11. Trainees should not be allowed to go on and learn a new skill in the course until they have mastered the one they are working on.

___ Agree completely
___ Agree moderately
___ Undecided
___ Disagree moderately
___ Disagree completely

12. The standards for passing tests are too high and should be lowered so that more trainees can qualify.

___ Agree completely
___ Agree moderately
___ Undecided
___ Disagree moderately
___ Disagree completely